Contributions to a better Knowledge of the Pyrenomycetes—I: A Study of Miscellaneous Species.

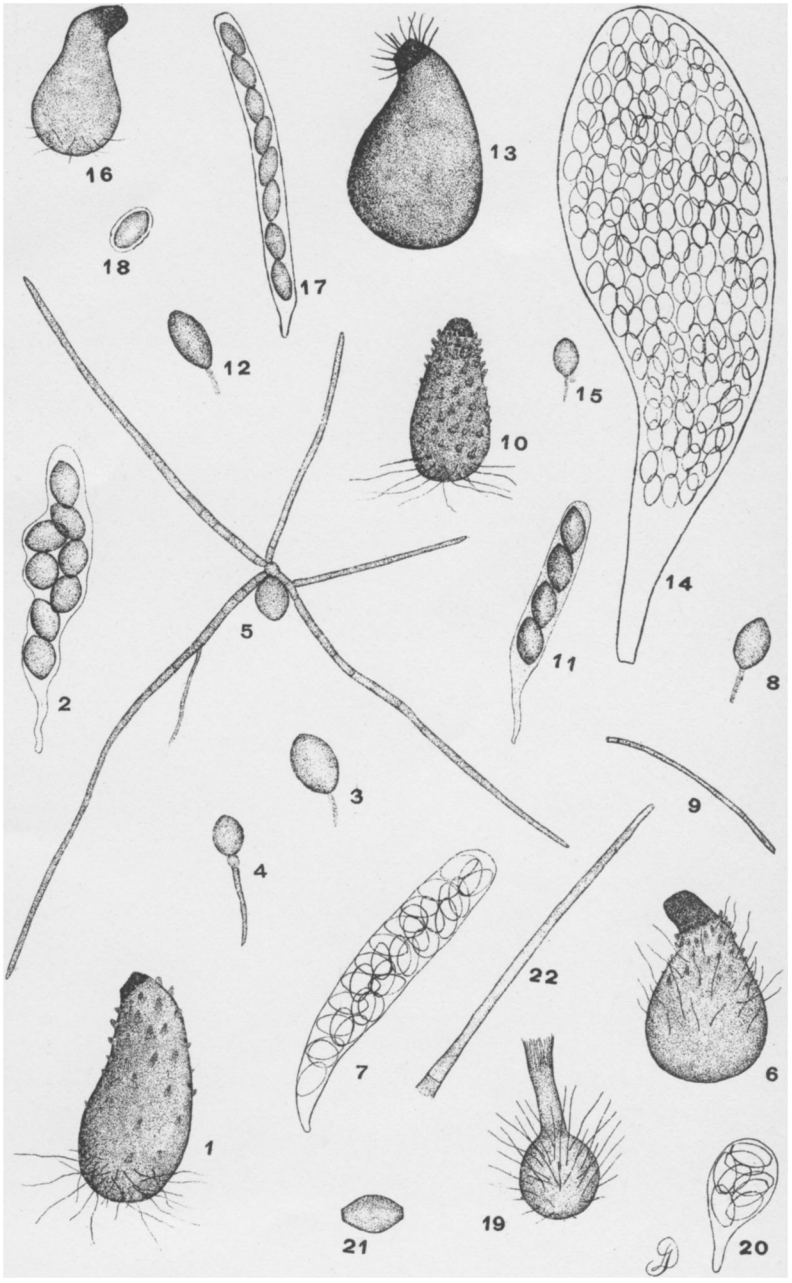
By David Griffiths

(With Plates 365, 366)

The following paper results from a study of a portion of my recent collections in this interesting group of fungi, and consists mainly of species from the Northwest, where the greater part of my collecting has been done. Of the species discussed *Trematosphaera caryophaga* alone was collected east of South Dakota. The other species were either collected in South Dakota, Wyoming, or Montana, or cultivated upon herbage which was obtained from these states.

During my investigations several species have been cultivated which are not recorded here, because of their extreme peculiarity and consequent necessity of obtaining more information regarding them. Some very peculiar modifications have been found in species of the genus *Pleospora*, developed under artificial conditions. In one instance a small quantity of an evident species of this genus developed perfectly superficial perithecia having radiating septate appendages, the whole having much the appearance externally of a perithecium of *Erysibe*. I find that some species of this genus develop very satisfactorily at times after being dried for several months. One immature species collected on dead culms of *Poa Nevadensis* in the Big Horn Mountains in August, 1898, grew nicely on being placed in a moist chamber for a few weeks in March and April, 1899. If some method of inducing more of the *Pyrenomycetes* to become mature could be devised it would be a boon to the collector, for, if the experience of others in the least resembles mine they find about one half of their collections in this group either sterile or immature.

The species of *Sordaria* recorded here are of special interest for several reasons. So far as I am aware, four of them have not been recorded before for this country. If once found they can be cultivated very easily and made use of by the teacher in demonstra-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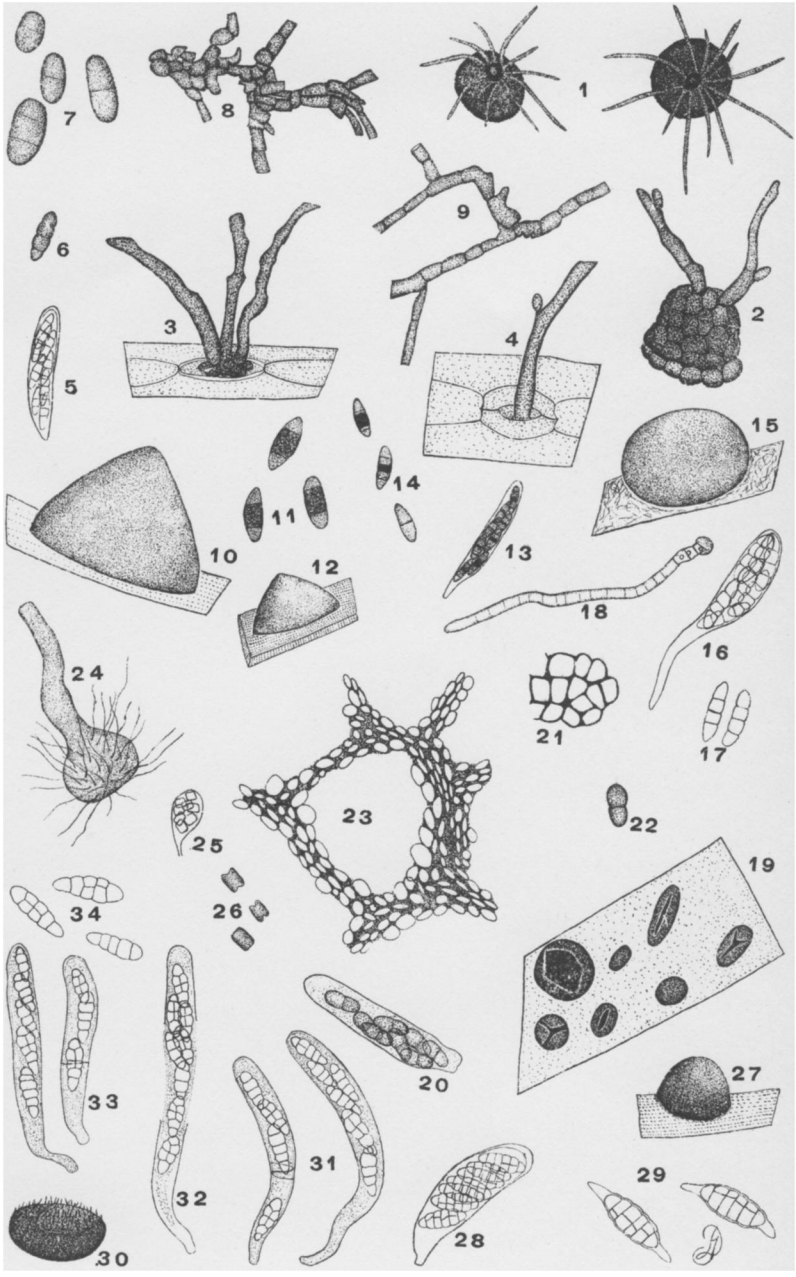

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tions. I know from experience that it is difficult for the young student to form a clear conception of how the asci and spores look within the perithecium although he actually sees them escape from it when it ruptures under the cover glass. With a good condenser one can make out the shape of the asci in these species quite well without rupturing the perithecium at all. This is especially true of such a polysporous form as *S. curvicolla.* I have in several instances been able to secure the perithecia of this species, before they were yet mature, showing one or two large asci protruding above the other younger ones, and having mature spores, while the others had only very young and imperfectly outlined ones within them. As the younger asci develop, the older ones rupture, and their spores escape through the ostiolum, forming a black globule on the top of the perithecium. This is also true, to a less degree, of the two species of *Melanospora.*

Melanospora Poae sp. nov.

Perithecia scattered or gregarious, superficial, thin, membranous, white turning to black and opaque, prolonged above into a curved or twisted beak once to twice the length of the perithecium, covered with long delicate flexuous sparingly septate hairs, 140–180 μ × 500–600 μ: asci broadly clavate, short stipitate, evanescent, without paraphyses, 10–13 μ × 26–30 μ: spores very variable, oblong or cuboidal with an apical grove and often flattened parallel to it, 4.5–5 μ × 5.5–6.5 μ. *Pl. 336. f. 24–26.*

This species has been cultivated on dead culms and leaves of *Poa Nevadensis* collected in the Big Horn Mts., near Buffalo, Wyo., Aug., 1898 (Williams and Griffiths). The culms and leaves were thoroughly moistened and placed in a moist chamber on the 14th of March. Mature perithecia were found on the 29th of the same month—a remarkably short time for the development of this class of fungi. In order to make certain that the perithecia were not already partly developed before the material was placed in the moist chamber, two other cultures were made in April. This time the material was carefully examined, moistened and placed on sterilized filter paper in a Petri dish. Quite a growth of mycelium extended from the culms and leaves over the paper, and the perithecia were again developed entirely distinct from the dead herbage. In neither culture have I been able to find conidia.

There are plenty of Hyphomycetous conidia, especially those of *Cladosporium* and *Alternaria*, but no connection has been traced with any conidial form found on the herbage used. Attempts have been made to germinate the ascospores without success. It is hoped that they will grow later in the season and that pure cultures can then be made.

Melanospora Townei sp. nov.

Perithecia superficial, scattered, thin, membranous, transparent, globular, covered uniformly with long straight or slightly wavy irregularly outlined hairs and surmounted by a cylindrical beak which terminates in a loose aggregation of straight or slightly wavy hairs of unequal length, white turning to light transparent umber and finally black, 225–300 μ in diameter; beak about equal to the diameter of the perithecium and 60 μ in cross-section: asci very evanescent, broadly clavate to obovate, short-stipitate, 8-spored, 30–40 μ × 60–75 μ: spores crowded, olivaceous, becoming dark and opaque, elliptical, 15–17 μ × 20–25 μ; the slightly projecting truncate apices, when viewed endwise, are seen to have a relatively large hyaline pore in the flat truncate ends. *Pl. 365. f. 19–22.*

At my request, Mr. J. R. Towne, of Aberdeen, S. D., sent me fresh material of *Salsola kali tragus* which was affected with various species of *Hyphomycetes*. This material reached me on the 19th of March, when it was placed immediately in a damp chamber and kept thoroughly moistened until the first of June. On the 9th of May the beautiful white perithecia of the above species appeared in abundance.

In about three days after the material was placed in culture there occurred a very luxuriant growth of a species of *Alternaria*. This completely covered the twigs with a dense black layer of spores and hyphae which promised to choke out anything else that might develop. About the 1st of May this ceased to grow and all of the twigs were then covered with a layer of dormant *Alternaria* spores. When the perithecia appeared they were produced perfectly superficial and loose on the top of these masses of spores. I was unable to trace any connection between them and any conidia or distinct mycelium, although some of them grew on the surface of the glass in close proximity to the twigs. All attempts to germinate these ascospores have thus far proved futile.

This species resembles *M. leucotricha* Cda. very much outwardly, except that the perithecia are less hairy and the ostiolum less fimbriated. The spores and asci are, however, decidedly different although about equal in size. Specimens from Rehm's Ascomycetes have slightly inequilateral spores with acute hyaline apiculi. I have not been able to find asci with mature spores in my specimens, but they are common in the European ones. The illustration of the ascus in this paper was made from one in which the spores were just beginning to change color, because of my inability to get the asci with perfectly mature spores out of the perithecia without rupturing them. In fact the asci of this species are much like those of *Sordaria curvicolla* as regards persistency. I have often found immature asci in perithecia which had a globular mass of mature spores on the ostiolum, showing that there is a succession of development correlated, I judge, with the large size of the fully formed asci as compared with that of the perithecium. Some of the asci become mature, rupture, and allow their spores to escape, thereby giving room for other younger asci to develop.

SORDARIA MINUTA Fckl.

Perithecia superficial, scattered, thin, membranous, white to fuscous, and so transparent that the spore-bearing area which occupies rather less than half the length of the perithecium can be readily distinguished, covered with short septate agglutinated hairs which are more prominent around the smooth, black, naked, conical, erect or curved apex, 140–180 μ × 360–510 μ: asci paraphyseate, cylindrical, with a contracted stipe one half the length of spore-bearing portion, 4-spored, 15–18 μ × 100–110 μ: spores monoseriate, elliptical, acutely pointed, olivaceous to black and opaque when mature, 13–14 μ × 16–22 μ, terminating below in a hyaline straight or slightly curved gelatinous appendage one half the length of the spore. *Pl. 365. f. 10–12.*

The asci are without exception 4-spored and uniseriate. Dr. Winter (Die deutschen Sordarien, Abhand. der Naturforsch. Gesell. zu Halle, **13**: 67–107. 1887) characterizes this species as having 4- or 8-spored asci. But he also finds in many of his collections and cultures of German specimens that one or the other form is quite constant, while in still other material the two forms are mixed.

Dead culms and leaves of *Poa Nevadensis* having on them

imperfectly developed perithecia of some of the *Sphaeriales*, probably a *Pleospora*, were collected in the Big Horn Mts., near Buffalo, Wyo., at an altitude of about 8000 ft. in August, 1898 (Williams and Griffiths). On the 14th of April, 1899, this material was thoroughly soaked and placed in a moist chamber. On the 3d of May mature perithecia of the above were present in considerable numbers. They continued to develop for two weeks longer when the material became dry. No precautions were taken regarding heat and moisture, the culms and leaves being cut into appropriate lengths to fit in an ordinary 3½-inch Petri dish, thoroughly moistened, and kept at laboratory temperature of about 21° in another Petri dish of larger size.

SORDARIA CURVULA DeB.

Perithecia scattered, superficial but firmly attached by the base, conical, truncate, curved and blackened at the apex, thin, membranous, sparingly covered with septate fasciculated hairs which are more prominent around the base of the blackened apex, 275–375 μ × 500–700 μ, spore-bearing area easily distinguished by transmitted light, asci paraphyseate, cylindrical-clavate, stipitate, 8-spored, 25–35 μ × 160–200 μ: spores biseriate with the two lower spores of the upper series overlapping the two upper spores of the lower series in the center of the spore-bearing portion of the ascus, oval, 19–21 μ × 24–28 μ, abruptly but acutely pointed, olivaceous to black with a gelatinous hyaline appendage at the lower end varying from one half to once the length of the spore. *Pl. 365. f. 1–5.*

This differs in several particulars from *S. curvula aloides* Wint. as recorded for this country by Messrs. Ellis & Everhart in N. A. Pyreno. 129, and corresponds more closely with the typical European species. The main differences occur in the characteristics of the hairs and the serial character of the spores. When the asci escape from the perithecium under the microscope they often appear distorted, becoming inflated so as to render the ascus more or less oval in outline, but leaving the arrangement of the spores undisturbed. I have had this phenomenon occur in water, 2 % chrome-alum, and 5 % caustic potash. Dr. Winter describes and figures a similar phenomenon in his specimens.

Dead stems of *Salsola kali tragus* affected with a species of *Ophiobolus* were collected at Aberdeen, S. D., in March, 1898. On the

10th of March, 1899, these stems were placed in a moist chamber under conditions similar to those described above for *Poa Nevadensis*. Mature perithecia of this species were first observed on April 7th. Subsequent cultures from the same material show the perithecia to develop in about three weeks. It appears to thrive best in an abundance of moisture. I have succeeded in getting the best growth of it when the herbage was not only thoroughly moist but when the chamber in which they were placed had water standing in the bottom of it. This species has also been cultivated in small quantity on dead scapes and leaves of *Allium* from the Big Horn Mountains of Wyoming, treated in the same way.

SORDARIA CURVICOLLA Wint.

Perithecia scattered, semi-immersed, pyriform, thin, membranaceous, about 600 μ in diameter, outline of asci plainly distinguishable by transmitted light, the conical truncate black apex clothed with short, delicate, simple, brown hairs, asci broadly clavate, polysporous with few evanescent paraphyses, 100–120 $\mu \times$ 270–300 μ: spores oval, 10–11 $\times$ 14–15 μ, olivaceous to dark and opaque with a hyaline appendage at the lower end about $\frac{2}{3}$ the length of the spore. *Pl. 365. f. 13–15.*

This species developed on *Salsola kali tragus* with *Sordaria curvula*, but I found none of it for about five weeks after the culture was started.

This differs from European specimens principally in the larger number of spores and their occasionally darkened apiculi. The latter is not invariable in my specimens and I apprehend that the former may be very variable in the species. Dr. Winter, after isolating an ascus in one of his specimens and rupturing it, counted 128 spores, but my specimens contain as many as 150 spores, a variation which I consider of minor importance. In other respects my specimens correspond very well with European specimens in Krieger's Fungi Saxonici, no. 33, as they do also with Dr. Winter's descriptions and figures.

I would not be surprised to know that this and the two previously described species are very common in this country although they have not been recorded before so far as I am aware. They are very liable to be overlooked by the collector. Indeed, it is with difficulty that I am able to find the perithecia in my cultures after they have become dry, although they are very numerous.

SORDARIA PLEIOSPORA Wint.

Perithecia scattered, with base slightly sunken in the soft substratum, covered especially above with the characteristic cellular agglutinated hairs of this group, together with a few long, delicate, simple, slightly flexuous, sparingly septate, brown hairs, and terminating in a curved, black, rounded or truncate beak, 450 $\mu \times 600$ μ: asci 28–32-spored, cylindrical-clavate, short-stipitate, 30–40 $\mu \times$ 175–200 μ: spores oval, 12–15 $\mu \times$ 18–21 μ, black and opaque with hyaline evanescent gelatinous appendage at lower end, about $\frac{2}{3}$ the length of the spore. *Pl. 365. f. 6–9.*

The measurements of spores and asci given above are considerably at variance with the published descriptions of European forms. The species is also described with gelatinous apiculus at each end of the spore. The number of spores in an ascus is said to vary from 16–64, but my specimens vary within the much narrower limits quoted above. The gravest variations, therefore, are in spore measurements which are given by Winter as 16–19 $\mu \times$ 24–34 μ. The variation in the size of the ascus is not so important in my estimation since the number of spores is so variable.

Associated with these species developed on *Salsola* stems I find an abundance of conidial forms resembling those which Winter found in his cultures. He, however, was unable to trace any connection between these conidial forms and the species of *Sordaria* with which it was associated and simply mentions it as a probable conidial form. He describes the hyphae as short, hyaline, continuous, with a bifurcate apex; and the spores as fusiform with attenuate base and rounded apex, continuous or obscurely uniseptate. In my material the spores are of two distinct forms both of which are evidently polyseptate. One form resembles those described above in everything but the septation of the spores while the other has long spindle-form spores resembling the former but pointed at both ends. Thus far I have found nothing that enables me to make any statement regarding their probable affinities.

SORDARIA FIMICOLA (Rob.) Ces. & DeNot.

This species developed on dead *Eleocharis* culms affected with *Pleospora aquatica* placed in moist chamber for 18 days. As it is described by Messrs. Ellis & Everhart in N. A. Pyreno., 127, it need only be mentioned here. *Pl. 365. f. 16–18.*

PERISPORIUM VULGARE Cda.

Perithecia superficial, scattered or gregarious and more or less angular from mutual compression, subglobose, carbonaceous, brittle, black and shining when mature, covered at first with a white tomentum which soon disappears, about 1/3 mm. in diameter: asci evanescent, broadly clavate, long-stipitate, 8-spored, 15–20 μ × 90–105 μ: spores 4-celled, 6–8 μ × 24–28 μ, brown, opaque, with the two end cells subconical and the two middle ones oblong-cubical, easily separating into separate cells. *Pl. 366. f. 15–18.*

This species is described and figured here for several reasons So far as I am aware, it has not been recorded before from this country, although figured and described by Messrs. Ellis & Everhart from European specimens. The specimens, which I have in good quantity, were collected by Mr. C. W. Williams, one of my former students, at Aberdeen, S. D., on sticks and straw in an old rubbish heap, March, 1898.

The ascospores germinate very readily and grow vigorously. The specimens from which the accompanying figures were made were cultivated from the ascospores of the material cited above. Ordinary filter paper was sterilized, placed in a Petri dish and moistened with a sterile decoction of ash leaves, and then inoculated with the ascospores. A delicate white mycelium was produced in abundance in a very few days, but careful search failed to discover any conidia. The perithecia became mature in six weeks. The spores (cells of ascospores) apparently have no regular method of germination, like those of the *Sordariaceae* or *Chaetomiaceae* for instance, but crack open irregularly to allow the promycelium to develop. Although the conditions were apparently favorable for mycelial development the perithecia were few and scattering in my cultures.

Pocosphaeria Allii sp. nov.

Conidial hyphae arising from a much branched torulous, knotted, brown, subepidermal mycelium, variously bent and knotted, 6–8 μ × 150–200 μ: conidia oval, 1–3-septate, brown, minutely echinulate, 11–14 μ × 24–30 μ: perithecia subglobose to hemispherical, 100–125 μ in diameter, erumpent, membranous, dark-colored with a thickened darker ring around the ostiolum; bristles around the thickened ostiolum black, smooth, straight to

recurved: asci cylindrical, contracted below, sessile, usually more or less curved or inequilateral, 12–15 μ × 50–60 μ: spores 3-septate, constricted at the septa, fusiform, brown, 5–8 μ × 16–20 μ. *Pl. 366. f. 1–9.*

On dead scapes and leaves of *Allium brevistylum* in Big Horn Mts., near Buffalo, Wyo., Aug., 1898. (Williams and Griffiths.)

The method of development of the perithecia in this species is of interest. The conidial hyphae usually protrude through the stomata in tufts of 2–5, and the perithecia are developed as a proliferation of the cells at their bases. At first the hyphae arise directly from the hypodermal mycelium which can be easily seen in tangential sections, but the proliferation of cells at their bases soon gives them the appearance of arising from a pseudo-parenchymatous mass of fungous cells. The hyphae are carried upward by this mass of cells, and the stoma and surrounding tissues become much distorted. The hyphae appear to produce conidia for some time after the beginning of perithecial development as shown in the figures. These, however, finally disappear before the perithecium becomes mature, and bristles develop surrounding the central ostiolum. Unfortunately mature material is rather rare, but the conidial and transitional stages have been collected in good quantity.

Pyrenophora Salsolae sp. nov.

Perithecia aggregated, subepidermal, early erumpent, subglobose to flattened, black, carbonaceous, brittle, about 300 μ in diameter, covered uniformly above with short, brown to black, septate, slightly wavy fugaceous bristles: asci cylindrical, contracted below into a short-stipitate base, 3–8-spored: spores one- or two-seriate, ovate, muriform, 4–5-septate with two longitudinal septa, slightly flattened, yellow, 6–11 μ × 20–26 μ. *Pl. 366. f. 30–34.*

The method of spore dissemination in this species is very interesting. There is near the middle of the ascus a transverse marking which is usually plainly visible. Sometimes it is simply a transverse line on the ascus wall, but more often it appears as a spiral of 1½ turns. When pressure is put upon the cover glass, the asci rupture on these markings, the top of the ascus shooting out for some distance, leaving in its wake the spores more or less deranged, but always in a long string imbedded in a gelatinous matrix, which does not remain attached to them when they are

isolated. Often one may find in the field the top and bottom of an ascus separated by twice its original length, and the two parts connected by a string of spores imbedded in their matrix. The rupture of the ascus is brought about doubtless here as in many other ascomycetes by the tension within it, for the gelatinous material with its contained spores occupies two or three times its original volume when set free by the rupturing of the ascus.

This was cultivated on dead stems of *Salsola kali tragus* with the species of *Sordaria* described above. It developed in rather small quantity in eight weeks' time.

Trematosphaera caryophaga (Schw.)

Perithecia superficial with their bases slightly sunken in the thin, black, carbonaceous crust which covers the nut more or less uniformly, rough, black, carbonaceous, brittle, hemispherical, with papilliform ostiolum, 350 μ in diameter, asci evanescent, subcylindrical with filiform paraphyses, 10–12 $\mu \times$ 55–75 μ: spores biseriate, oblong, narrowed and round at the ends, slightly inequilateral or curved, 3-septate with a darkened band surrounding the middle septum, 4–6 $\mu \times$ 10–16 μ. *Pl. 366. f. 12–14.*

This species described by Schweinitz, Syn. N. Am. Fungi, no. 1594 Trans. Amer. Phil. Soc. Phila., 215, 1831, has been included by Messrs. Ellis and Everhart, North American Pyreno. 207, with *T. nuclearia* (DeNot) Sacc., published in Micr. Ital. **9**: 462, *f. 4*; but a very little study of the specimens from different localities is necessary to convince one that the American form growing on decaying shells of hickory nuts, is very different from the European form growing on olive pits. Had I but one specimen I might consider the species variable enough to produce the differences which are observable; but the Pennsylvania specimens collected by Mr. Everhart and my own collected in the burrow of some rodent at Fort Lee, New Jersey, are remarkably constant in all their characters, even to the coloration of the spores. The main differences are those of size which are brought out in my figures (10 and 11, *pl. 366*) of these two species. The European species is larger throughout than the American—the perithecia measuring about 525 μ, the spores 6–8 $\mu \times$ 18–21 μ. I have been unable to get out complete asci from the European specimens at hand (Roumeguère Fungi Selecti Gallici, no. 4783). The colora-

tion of the spores differs markedly also. In the European specimens the spores are darker in color and the central band extends over all of the two central cells, while in the American ones there is a light streak between the dark band and the outside septa. The paraphyses are much less abundant in the European species.

In both species the dark band obscures the middle septum so that it is often difficult to determine whether the spores are really 3-septate or not. I find, however, that after soaking in glycerine for some time the central septum becomes more apparent. Its presence is sometimes indicated by a very slight constriction; in young spores it can be very distinctly seen.

Dothidea conspicua sp. nov.

Stroma immersed, irrumpent, surrounded by the lacerated remains of the ruptured epidermis, circular or oval, seldom confluent, flat, rough, black, ⅓–⅔ mm. in diameter: ascigerous cavities sunken, oval to conical and more or less angular from mutual compression, 50–60 μ × 100 μ: asci cylindrical-clavate, with a short, stout, blunt stipe, without paraphyses, 65–85 μ × 12–14 μ: spores sub-biseriate, unequally uniseptate, constricted, at first yellow, but finally dark and opaque, 5–6 μ × 13–18 μ. *Pl. 366. f. 19–23.*

On *Yucca angustifolia* at Billings, Mont., August, 1898. (Williams & Griffiths.)

Mr. J. B. Ellis described a *Phyllachora ? Yuccae* on *Yucca angustifolia* (Bull. Torr. Bot. Club, **22**: 440. 1895) collected by Dr. Egeling at Matamoras, Mexico. I thought at first that my specimen must be the fully developed condition of the immature species which he there describes; but the characteristics of the stroma alone are enough to separate it from the Mexican specimen, which also appears to me to be a *Dothidea*. The absence of paraphyses and the method in which the epidermis becomes ruptured and lacerated are also good characteristics which would separate the above described species from that described by Mr. Ellis. The nearest relative, however, of this species appears to be *Didymosphaeria yuccaegena* (Cke.) Sacc., Sylloge Fungorum, **1**: 708. This was originally described as *Sphaeria yuccaegena* Cooke, in Grevillea, **7**: 12. 1878, from specimens collected by Dr. Harkness on *Yucca communis*, at Sacramento, California. After the change in name made by Saccardo, cited above, Cooke in

Grevillea **18** : 28 wrote the species as *Didymosphaerella yuccogena* Cke. This species also may be a *Dothidea*. It certainly appears to have its asci produced in stromatic cavities without perithecia the same as the species here described ; and the spores have the typical unequal septation of the genus *Dothidea* when young, but they become more nearly equal when mature. In the general appearance of asci and spores there is but little difference between this species and the one which is described above. A specimen in the Ellis Herbarium from Dr. Harkness shows the spores to be larger and the asci nearly twice the width at the base. These are the only differences in the microscopic characters. The method of growth is, however, decidedly different. The stromatic areas in my species are two to three times as large, prominently erumpent and surrounded by the lacerated remains of the ruptured epidermis ; while in the other case the epidermis is unruptured although the specimens appear to be as fully developed as mine.

Pleospora aquatica sp. nov.

Perithecia scattered, subglobose to hemispherical, 140–180 μ in diameter, flattened when dry, subepidermal, remaining covered, membranous, black and smooth with flat indistinct ostiolum : asci cylindrical-clavate, curved, and often bent into a u shape, short-stipitate, without paraphyses, 22–29 μ × 95–125 μ : spores oval, 10–12 μ × 28–30 μ, slightly flattened, with 5 transverse and 2 to 4 longitudinal septa, constricted at all transverse septa and surrounded by a gelatinous hyaline covering which is prolonged into a short thick blunt appendage at either end. *Pl. 366. f. 27–29.*

This species was collected at Aberdeen, S. D., in May, 1896, on dead stems of *Eleocharis palustris* under water. The pond in which the collection was made, had been filled with artesian well water together with that obtained from natural drainage to a depth of not less than a foot since the previous season. I first discovered the fungus in April when it was immature. About a month later I visited the same locality again and found an abundance of it in the best condition possible. The pond contained from 2 to 2½ feet of water during the spring months and the culms of the previous year upon which the fungus grew were entirely submerged.

COLUMBIA UNIVERSITY, 1 July, 1899.

Explanation of Plate 365

1–3. *Sordaria curvula* DeB. Perithecium, ascus and spore.

4 and 5. *Sordaria curvula* DeB. Two germinating spores after 24 hours in water.

6–8. *Sordaria pleiospora* Wint. Perithecium, ascus and spore. Spores in ascus slightly deranged.

9. Hair from perithecium of *S. pleospora*.

10–12. *Sordaria minuta* Fckl. Perithecium, ascus and spore.

13–15. *Sordaria curvicolla* Wint. Perithecium, ascus and spore.

16–18. *Sordaria fimicola* (Rob.) Ces. & DeNot. Perithecium, ascus and spore.

19–21. *Melanospora Townei* sp. nov. Perithecium, ascus and spore.

22. Hair from perithecium of *M. Townei*.

NOTE.—All perithecia × 35, asci 230, and spores 315. Figs. 4 and 5 × 230; 9 and 22 × 315.

Explanation of Plate 366

1–9. *Pocosphaeria Allii* sp. nov.

1. Mature perithecia, × 50.

2. Young perithecium crowned with the conidial hyphae, × 230.

3. Conidial hyphae showing a slight proliferation of cells at their bases, × 230.

4. A single hypha projecting through a stoma, × 230.

5. Ascus, × 230.

6. Spore, × 315.

7. Conidiospores, × 315.

8 and 9. Mycelium as seen through the transparent epidermis, × 230.

10 and 11. *Trematosphaera nucleiara* (DeNot.) Sacc. from Roumeguère Fungi Selecti Gallici, no. 4783.

10. Perithecium, × 35. 11. Spores, × 315.

12–14. *Trematosphaera caryophaga* (Schw.).

12. Perithecium, × 35. 13. Ascus, × 230. 14. Spores, × 315.

15–18. *Perisporium vulgare* Cda.

15. Perithecium grown on paper in Petri dish, × 75.

16. Ascus, × 230. 17. Spores, × 315. 18. A single cell of ascospore after 24 hours' growth in water.

19–23. *Dothidea conspicua* sp. nov.

19. Portion of affected *Yucca* leaf, × 12. 20. Ascus, × 315.

21. Portion of a stoma, × 35. 22. Spore, × 315. 23. A stromatic cavity showing cellular structure, × 230.

24–26. *Melanospora Poae* sp. nov.

24. Perithecium, × 50. 25. Ascus, × 315. 28. Spores, × 480.

27–29 *Pleospora aquatica* sp. nov.

27. Perithecium, × 35. 28. Ascus, × 230. 29. Spores, × 315.

30–34. *Pyrenophora Salsolae* sp. nov.

30. Perithecium, × 35. 31. Two asci, one of which shows the spiral line of dehiscence. 32. An ascus slightly extended after rupturing. 33. Two asci, one of which shows a straight line of dehiscence. All × 230. 34. Spores, × 315.